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(56) Documents Cited:
WO 2003/067241 A2 **WO 2003/040717 A1**
WO 2003/038421 A1 **JP 630142253 A**
JP 630132152 A

(58) Field of Search:
UK CL (Edition V) G1B
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Other: Online: EPODOC, WPI, Japio

(54) Abstract Title: **Protecting gas sensors from condensation**

(57) Condensation build-up on gas sensors is alleviated by a device comprising a filter 1 which at least partially surrounds the sensor 8 and a screen 2 which at least partially surrounds the filter. The filter may comprise a mesh or open cell foam of non-metallic material e.g. open cell plastic foam and the screen may be of stainless steel.

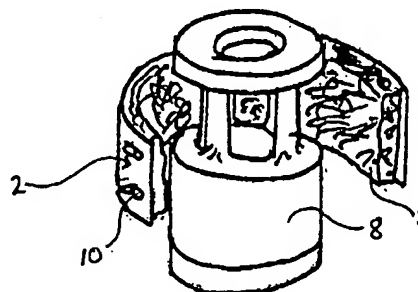


FIGURE 3

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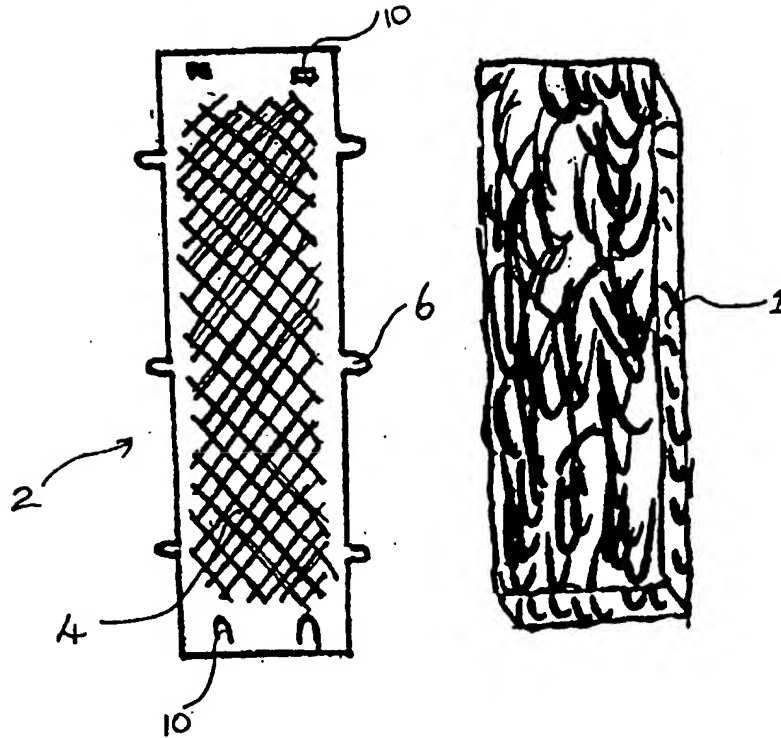


FIGURE 1

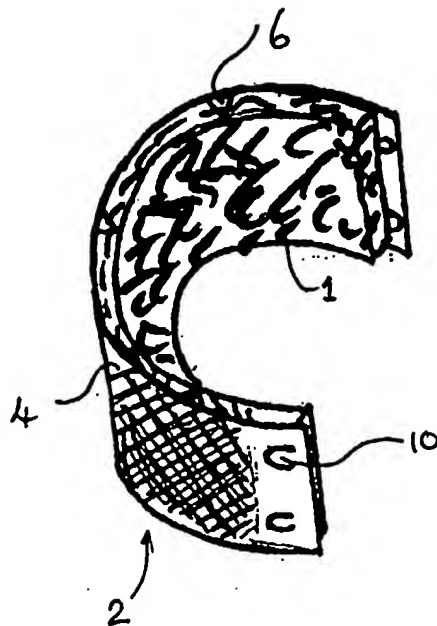
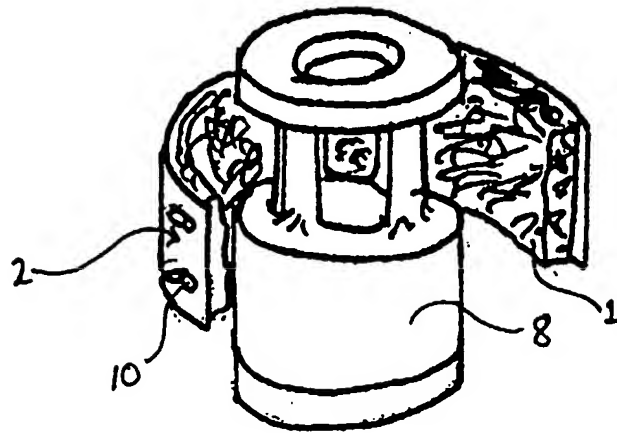
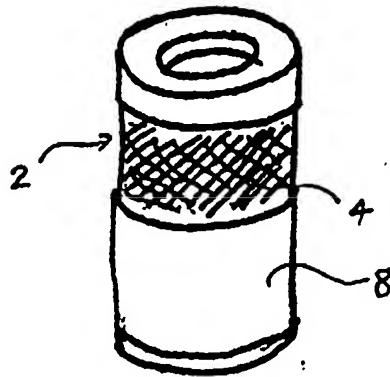


FIGURE 2

FIGURE 3FIGURE 4

Condensation FilterDescription

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This invention relates to condensation filters and especially, but not exclusively, to such filters for use in preventing moisture build-up on gas sensors, for example, by providing a filter around
10 the gas sensors.

Gas sensors, such as those commonly used for detecting environmental gases, for example, methane
15 or other volatile hydrocarbons and carbon dioxide, are often used in areas where there is high humidity.

If a gas in the atmosphere is to be detected,
20 there must be a free air passage into the sampling or measuring chamber. An undesirable consequence of this free air passage is that water vapour can also enter the sampling or measuring chamber.

25 In some applications, typically offshore or in coastal installations, the relative humidity can reach 90%RH, depending on local conditions.

High or changing humidity levels, such as those
30 experienced in offshore installations, cause problems with gas sensors because such sensors generally run at temperatures which are cooler than the ambient environment. The lower temperature of the gas sensor causes water droplets to condense

thereon, which, in turn, disrupts the optical sensor signals to produce false readings

False readings caused by condensation can have
5 serious safety implications, for example, if the sensor is used for flammable gas hazard detection on a safety critical installation, such as an oil or gas production platform offshore, an incorrect reading could lead to a serious accident.

10

Several solutions to this problem have been sought, for example, the gas sensor can be surrounded with an electric heater or other heating device to warm the sensor to at least the same
15 temperature as the surrounding air so that condensation does not form. Another solution to the problem has been to pass larger currents through the gas sensor than is actually required, this causes the gas sensor to warm up, again tending to prevent
20 condensation build-up.

Although both of these solutions can prevent condensation build-up on gas sensors, therefore preventing false readings, they do have a
25 disadvantage in that the cost of running the equipment is higher than necessary due to the larger amounts of power required.

Accordingly it is an object of the present
30 invention to overcome, or at least substantially reduce, the disadvantages associated with known

types of condensation filter for gas sensors, as claimed above.

Accordingly, the present invention provides
5 apparatus for preventing, or at least substantially reducing, condensation build-up on a gas sensor, comprising:

- a filter arranged to at least partially surround a gas sensor; and
- 10 a screen associated with the filter and arranged to at least partially surround the filter.

Preferably, the filter comprises a mesh or open cell foam of non-metallic material, for
15 example, a plastics material such as an expanded, open cell plastics foam. The foam may be of any suitable pore size but preferably the pores are 0.2 mm to 1.8mm, more preferably 0.5 mm to 1.5mm, even more preferably 0.8mm to 1.2mm and most preferably
20 1.0mm.

The screen is preferably a mesh constructed from any suitable metal or alloy, for example stainless steel. The mesh may be open in structure,
25 preferably 20 to 90% open, even more preferably 35 to 80% open and most preferably 40 to 75% open.

The screen may further comprise pliable tabs which, in use, may be used to attach the screen to
30 the filter.

The screen and/or the filter may be constructed in separate lengths such that they can be applied to existing gas sensors by being wrapped around them. Preferably, the screen and/or filter further
5 comprises securing means to allow it or them to be secured around a gas sensor to be protected.

In order that the invention may be more fully understood, a preferred embodiment of condensation
10 filter apparatus in accordance therewith, will now be described by way of example only and with reference to the accompanying drawings, in which;

Figure 1 is a view of the two components
15 of condensation filter apparatus for protecting a gas sensor;

Figure 2 is a perspective view of the assembled components of the condensation filter
20 apparatus shown in Figure 1;

Figure 3 is a perspective view of the condensation filter apparatus being positioned around a gas sensor; and
25

Figure 4 is a perspective view of the condensation filter apparatus wholly positioned around a gas sensor in use.

30 As shown in Figure 1, condensation filter apparatus for protecting a gas sensor from

condensation build-up comprises a filter pad 1 and a screen indicated generally at 2.

5 The filter pad 1 comprises an open cell foam structure and is preferably made of a suitable non-metallic material. The pores of the filter pad 1 are preferably 1.0mm in diameter but any pore size which allows for diffusion of the gas to be sampled and/or measured is suitable.

10

The screen 2 is made of an open mesh 4 constructed from any suitable metal or alloy. Preferably, the mesh is 40 to 75% open but this may vary. Pliable tabs 6 are arranged along the edges 15 of the screen 2. This allows the screen 2 and the filter pad 1 to be secured together, as shown in Figure 2, for location around a gas sensor.

20 The filter pad 1 and screen 2 are wrapped around a gas sensor 8, as shown in Figure 3, such that the gas sensor 8 is at least partially surrounded by the assembled condensation filter apparatus.

25 The screen 2 further comprises securing means 10 to allow its ends to be secured around the gas sensor 8, as shown in Figure 4, thereby enclosing the filter pad 1 between the gas sensor 8 and the screen 4.

30

CLAIMS

1. Apparatus for preventing, or at least substantially reducing, condensation build-up on a gas
5 sensor, comprising:

a filter arranged to at least partially surround a gas sensor; and

10 a screen associated with the filter and arranged to at least partially surround the filter.

2. Apparatus according to claim 1, wherein the filter comprises a mesh or open cell foam of non-
15 metallic material, for example, a plastics material such as an expanded, open cell plastics foam.

3. Apparatus according to claim 2 wherein the foam is of a pore size of 0.2mm to 1.8mm.

20 4. Apparatus according to claim 3, wherein the pore size is of 0.5mm to 1.5mm.

5. Apparatus according to claim 4, wherein the pore
25 size is of 0.8mm to 1.2mm.

6. Apparatus according to claim 5, wherein the pore size is of 1.0mm.

30 7. Apparatus according to any preceding claim, wherein the screen is a mesh constructed from metal or alloy, for example stainless steel.

8. Apparatus according to claim 7, wherein the mesh is open in structure.

5 9. Apparatus according to claim 8, wherein the mesh is 20 to 90% open.

10. Apparatus according claim 9, wherein the mesh is 35 to 80% open.

10

11. Apparatus according to claim 10, wherein the mesh is 40 to 75% open.

12. Apparatus according to any preceding claim,
15 wherein the screen further comprises pliable tabs which, in use, can be used to attach the screen to the filter.

13. Apparatus according to any preceding claim,
20 wherein the screen and/or the filter are constructed in separate lengths, such that it or they can be applied to existing gas sensors by being wrapped around them.

25 14. Apparatus according to any preceding claim, wherein the screen and/or filter further comprises securing means to allow it or them to be secured around a gas sensor to be protected.

30 15. Apparatus for preventing, or at least substantially reducing, condensation build-up on a gas

sensor, substantially as hereinbefore described with reference to the accompanying drawings.

16. A gas sensor when protected by apparatus
5 according to any preceding claim.

17. In combination, a gas sensor protected by anti-
condensation build-up apparatus, substantially as
hereinbefore claimed with reference to the
10 accompanying drawings.



Application No: GB 0217680.8
Claims searched: All

Examiner: Michael R. Wendt
Date of search: 19 November 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A,E		WO 03/067241 A2 (RAIBLE) See WPI Abstract Accession No: 2003-698592.
A,E		WO 03/038421 A1 (A. T. M) e.g. see Figure 1; page 6 last paragraph etc.
A,E		WO 03/040717 A1 (BOSCH) e.g. see Figure 1 & WPI Accession No: 2003 - 441619.
A		JP 630142253 A (FUJIKURA) - see PAJ Abstract.
A		JP 630132152 A (NGK) - see PAJ Abstract.

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^v:

G1B

Worldwide search of patent documents classified in the following areas of the IPC⁷:

G01N

The following online and other databases have been used in the preparation of this search report:

EPODOC, WPI, Japio